Operation Microscope
OPMI CS

Instructions for use

G-30-1148-e 23/04/1992

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This instrument has been developed and tested in accordance with Carl Zeiss safety standards and with national and international regulations. A high degree of instrument safety is thus ensured.
It is recommended in these regulations that the manufacturer explicitly informs the user about the safety aspects of operating the instrument. This chapter contains a summary of the most important precautions to be observed.
Further safety notes, which are framed, are also contained in other parts of this user's manual.
Safety is only ensured when this instrument is operated properly. Please read through this manual carefully before turning the instrument on. You may obtain further information from our service organization or authorized representatives.

Regulations

- This instrument was developed in accordance with the following regulations:
  - VDE
  - IEC
  - UL
  - CSA

  Manufacturing, inspection, installation and service are done in accordance with German and international regulations (Good Manufacturing Practice).
- The instrument must be connected to an emergency backup line supply in accordance with the regulations or guidelines which apply in your country for the specific application.
- This instrument complies with German and international safety standards and carries the "GS" sign of approval.
- It is the duty of the operator to ensure that applicable accident prevention regulations are observed.

Notes on installation and usage

General

- Do not operate the instrument in explosion-risk areas. Its use in the presence of volatile anesthetics or inflammable solvents such as alcohol, benzin or similar chemicals is prohibited.
- Do not station this instrument in damp rooms. Do not expose the instrument to water splashes, dripping water or sprayed water.
- Modifications and repairs on this instrument and on instruments used with the OPMI CS may only be performed by our service representative or by other authorized persons.
- The manufacturer will not accept any liability for damage caused by unauthorized persons tampering with the instrument; such tampering will also forfeit any rights to claim under warranty.

- Only use this instrument with the accessories obtained from us. Only use other accessory equipment when the manufacturer or the manufacturer of the accessory equipment has certified that its usage will not impair the safety of the system.
- Only personnel who have undergone training and instruction are allowed to use this instrument.
- It is the duty of the operator to train and instruct all staff using the equipment.
- The operator must carefully read this user's manual together with the user's manuals of the other equipment.
- Keep the user's manuals where they are easily accessible at all times.
- The framed passages in this manual are safety notes and special information. Read these with special care and attention.
- Never look at the sun through the binocular tube.
- Never pull at the light guide cable, at the power cord or at other cable connections.
- Always handle the microscope suspension system cautiously to prevent accidents.
- This instrument is a high-grade technological product. In order to ensure perfect and safe working order of the instrument, we recommend that our service representative inspects this instrument on a regular basis.

Important before turning on instrument for first time

Our service representative will install the Operation Microscope OPMI CS onto the suspension system. He will check the following points. The operator must ensure that these points are observed in future.

- Ensure that all mechanical connections (specifics in the user's manuals) which ensure safety or perform a supporting function are correctly fitted and secure. Firmly tighten any parts which are loose or not tightened properly.
- Make sure the voltage the suspension system is set for corresponds with the available line voltage.
- Plug the instrument only into a power outlet which has a properly connected ground connection.
- Only use cables and plugs which are in good working condition.
- Always make sure the instrument and all accessory equipment is in proper working condition before operation.

Important each time before turning on instrument

- Go through the checklist on page 21.
- Ensure that all mechanical connections described in the user's manual which ensure safety or perform a supporting function are correctly fitted and secure. Firmly tighten any parts which are loose or not tightened properly.
- Re-attach or close any covers, panels or caps which have been opened or removed.
- Pay special attention to warning symbols on the instrument (triangular warning signs with exclamation marks) and labels (see figure 1). If any label is missing on your instrument, please contact us or our authorized representative. We will supply the missing labels.
- Do not cover any ventilation grids or slits.
- Make sure the power cable and the foot control panel connector are properly plugged in.

Important when using the instrument

- The long extension of the stand base must always point in the direction of the surgical field.
- Never look directly into the light source, e.g. into the microscope objective or into a fiber light guide.
- When operating on the eye, always use eye-protection filter GG 475 so that the patient's eye is not exposed to unnecessary UV radiation, which damage the retina.

Important when you are finished using the instrument

- Always use the main power switch of the instrument to turn it off.
- Be sure to turn off the main power switch when the instrument is not in use.

Changing the microscope equipment

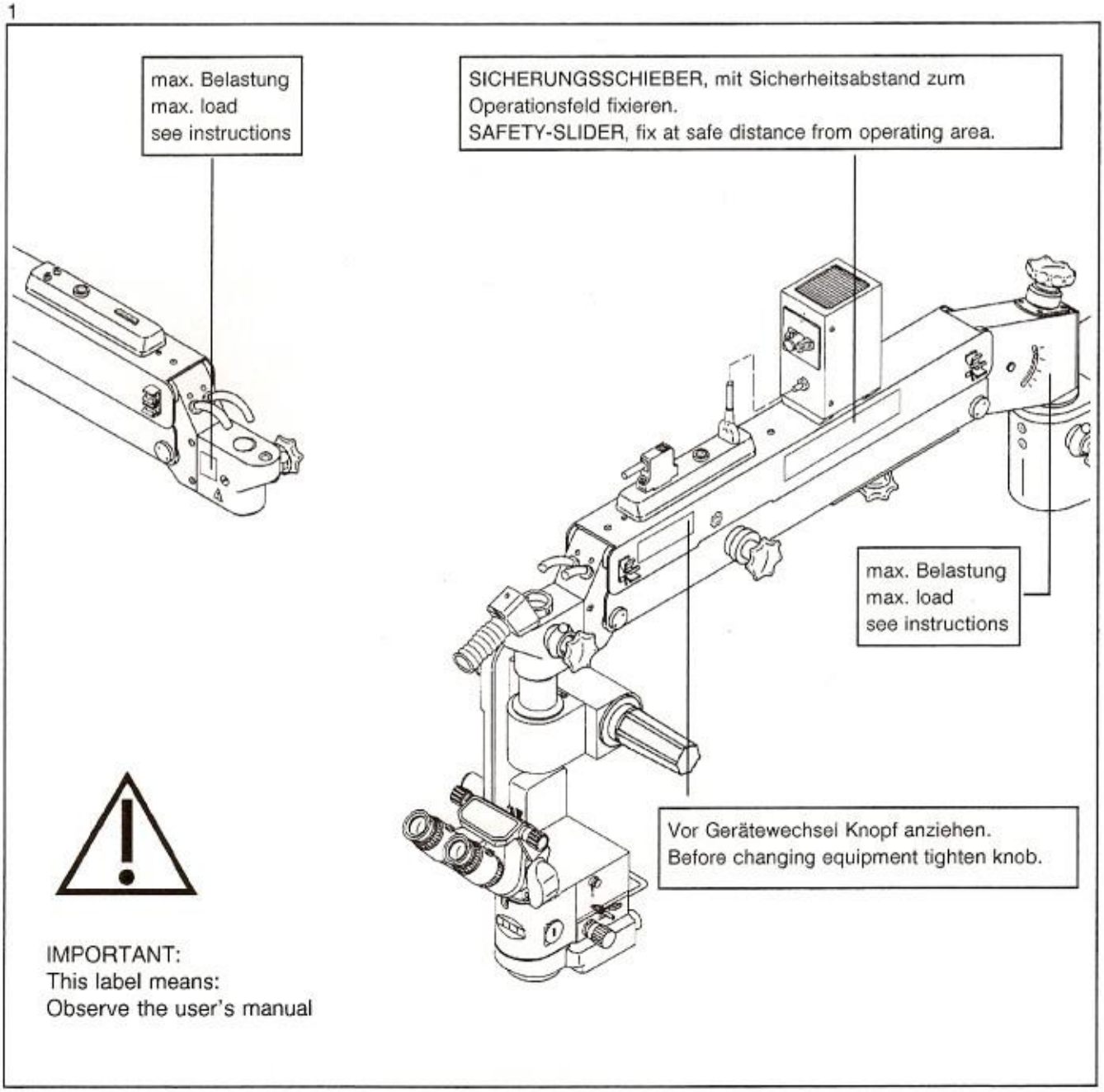
- Clamp the suspension arm of the suspension system before attaching or removing a component (microscope, tube, etc.). Afterwards the suspension system must be re-balanced.

Warning labels and notes

Caution:
Observe all warning labels and notes!

If any label is missing on your instrument, please contact us or our authorized representative. We will supply the missing labels.

1



General (figure 2)

Operation Microscope OPMI CS is designed for use in all microsurgical disciplines. Its main field of application is ophthalmology.

The following equipment may be attached at the upper interface (1):

- documentation devices
- coobservation tubes
- a physician's safety filter when the microscope is used in conjunction with a laser.

Various microscope components with different types of illumination systems and imaging optics may be attached at the lower interface (2). In this manner, the properties of the instrument may be optimized for the specific microsurgical application.

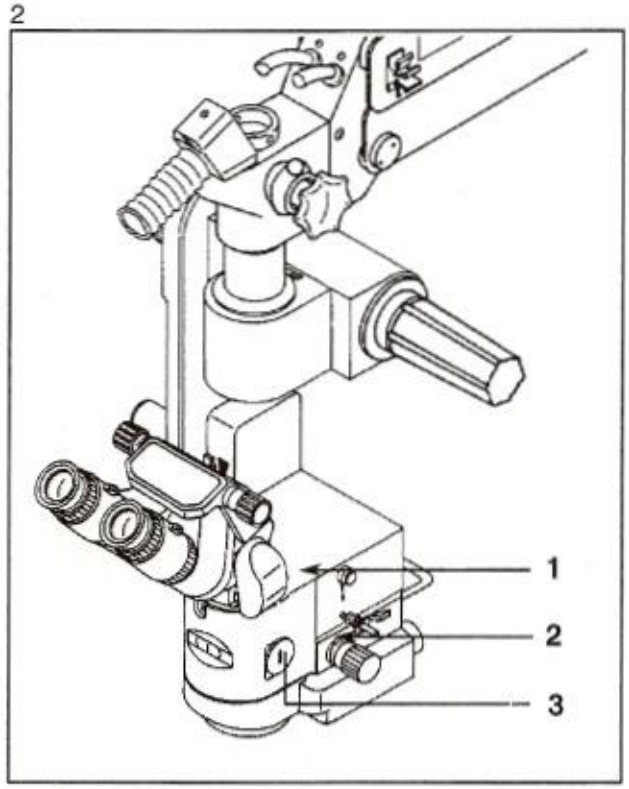
Grips or an assistant's microscope may be attached at position (3).

This user's manual describes the following equipment:

- Operation Microscope OPMI CS
- inclinable 180° binocular tube, f = 170 mm
- 10x22B screw-type high-eyepoint eyepieces with integrated eyecups.

Operation Microscope OPMI MD may be used on various suspension systems. This user's manual describes its use with Floor Stand S4.
The principle described in section "Attaching the microscope equipment" applies for all other suspension systems.

2



The following functions of the operation microscope can be controlled using a foot control panel, a hand control panel or an operating chair:

- illumination on / off
- front-to-back and lateral tilt.
- zoom
- focus.

This user's manual describes the use of a foot control panel.

Safety devices of the instrument
(figure 3)

Safety slider (1)
The safety slider is used to limit the minimum vertical working distance to the field of surgery. This setting must be adjusted before surgery.

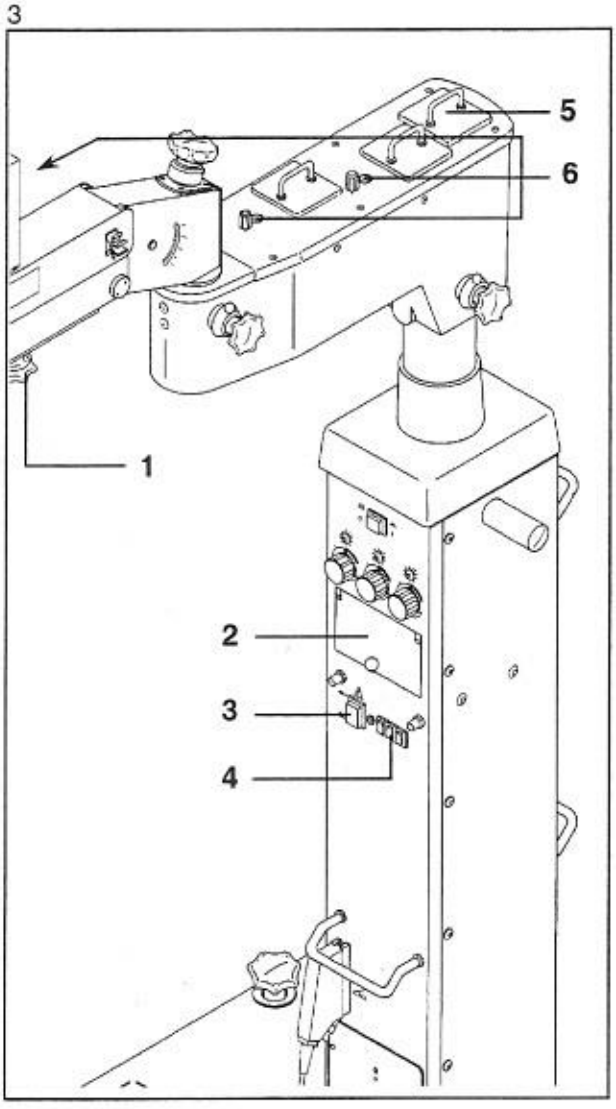
Switch (3) for back-up power supply of the microscope functions
This switch is a safety feature of the instrument. If there is a failure of the microscope functions (focus, zoom, front-to-back and lateral tilt motion), the back-up power supply can be switched on here. There are the following differences to normal operation when the back-up power supply is on:

- The LED next to switch (3) blinks.
- Only the lamp on/off function is available on the foot control unit.
- The motorized functions of the operation microscope (zoom, tilt motion) are controlled over rocker switches (4).
- The microscope functions run at maximum speed. The setting underneath cover (2) is inactive.

Back-up lamp module (5)
Exchanging the lamp is described on page 26.

Thermal circuit breakers (6)
The thermal circuit breakers switch off the lamp modules when they overheat. If this happens, you must correct the cause of the overheating and then press the thermal circuit breakers back in after the lamps have cooled down.

3



Operation microscope OPMI CS
(figure 4)

1 Connector
The electrical supply for the operation microscope is provided over this connector.
Note:
Switch off the main switch on the suspension system before disconnecting or connecting this connector.

2 Microscope rotation shaft
Before inserting the rotation shaft of the microscope into the reception bore of the suspension system or a coupling, lubricate the shaft lightly (e.g. with Vaseline).

3 Indicator arrows
These arrows mark the focussing range on the microscope carrier arm and the position of the microscope within this range. Initial position: 30% upward, 70% downward.

4 Securing screw
When attaching the binocular tube or another component, tighten this screw firmly as far as it will go.

5 Indication window for magnification factor γ of zoom system
You may calculate the magnification of the entire system and the size of the field of view as described on page 29.

6 Holder
Run the cable of connector (1) through one of the two holders on top of (6.1).

7 Cable conduit
Run the light guides through this cable conduit. This can be done easily when the conduit is taken off the microscope first.

8 Handle for moving the microscope
A sterilizable grip (8.1) can be put over the the handle.

8 Dovetail
A microscope component can be attached here.

10 Initializing button
Press this button to return to the initial position of the focusing range. See also position (3).

11 Securing screw
This screw fastens the microscope component. The screw must be tightened firmly as far as it will go.

12 Caps
When these caps (located on both sides) are removed, handles or an assistant's microscope may be attached.

13 Click-stop coupling
To tilt the operation microscope in steps of 30°, pull the knob out as indicated by arrow and push it down. When you release the knob, it automatically snaps back into the stop and the coupling locks.

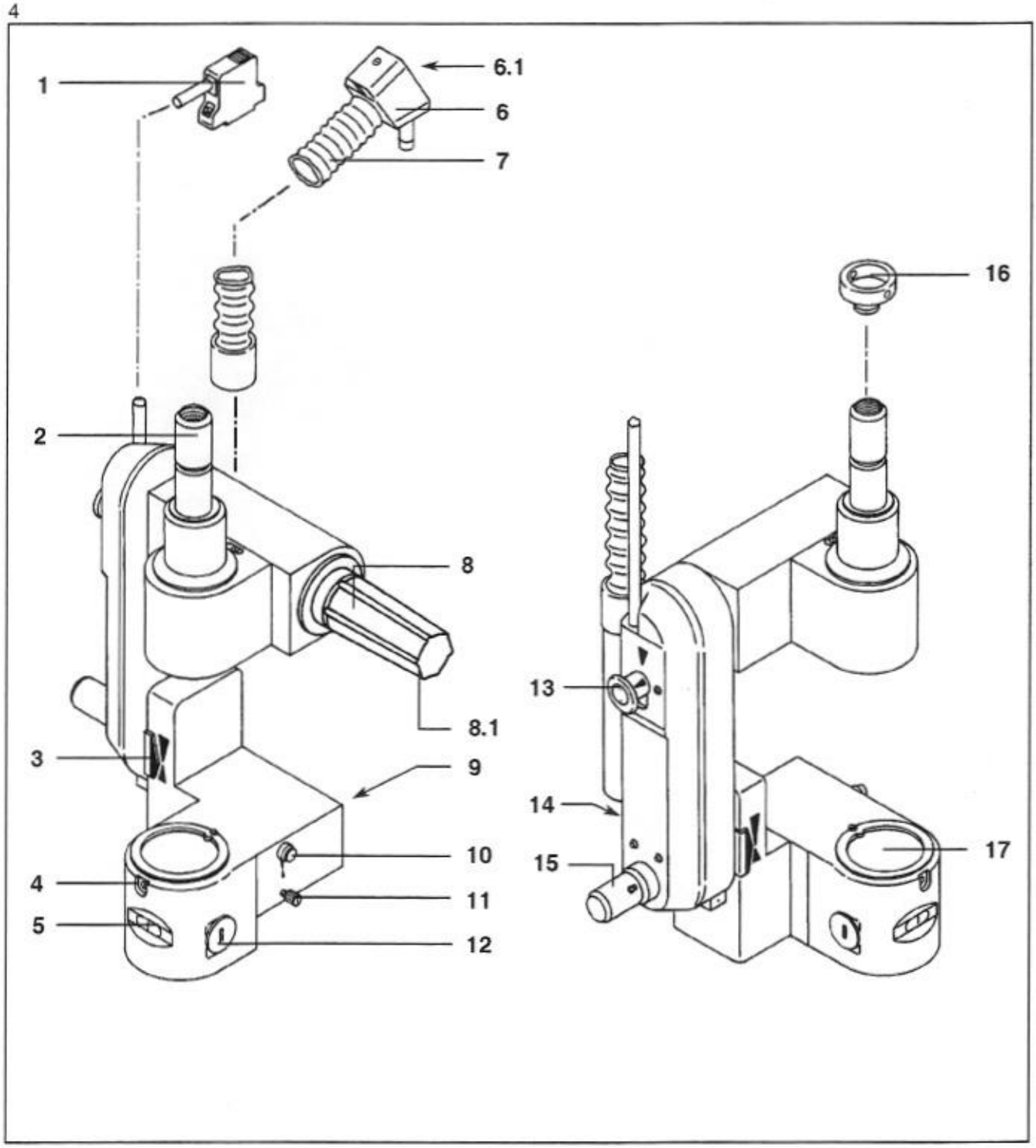
14 Light guide holders
Press the light guide into these holders to secure them.

15 Handle for tilting the microscope
Turning this handle controls the tilt to the front or to the back. The motorized movement has two speed levels.
Level 1: slow movement,
Level 2: fast movement.
A sterilizable cap (8.1) may be put over the handle.

16 Securing screw
This securing screw retains the microscope in the reception bore of the suspension system and secures it from falling out. Be sure to screw in this screw firmly as far as it will go.

17 Dust cap
Remove this cap to attach the binocular tube or another unit.

4



Binocular Tube and Eyepieces

(figure 5)

1 Knurled knob for setting interpupillary distance
The interpupillary distance is correctly set when only one image is seen when looking through both eyepieces.

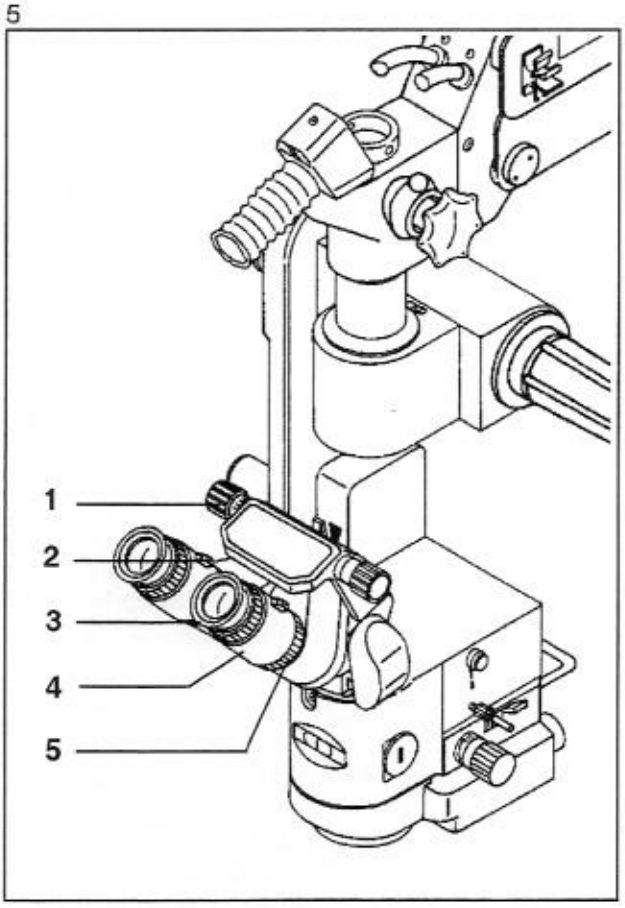
2 Catch lever for diopter setting

3 Eyecup
The cups must be adjusted so that the entire field of view is visible.

4 Diopter scale
The eyepieces can be adjusted to compensate for ametropia. To do this, push in catch lever (2) and turn the eyepiece. The diopter can be read off the diopter scale.
Setting the eyepieces is described on page 20.
For measurements and to assist focusing, the eyepiece can be delivered with a reticle installed. Retrofitting a reticle can only be done in the factory or by our service representative.

5 Screw ring
Tighten this ring firmly when installing the eyepieces.

5



Note:
The principle described in this chapter also applies for all other suspension systems.

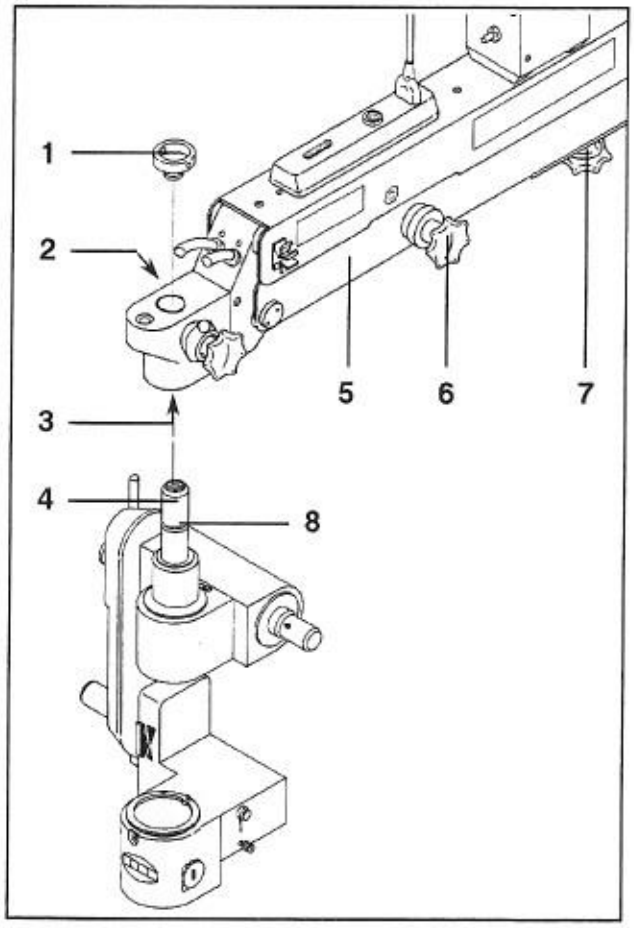
Attaching the microscope (figure 6)

Caution:
When using Floor Stand S4, the weight of the microscope and all the accessories must not exceed maximum 20 kg.

- Loosen safety slider (7). Place the suspension arm (5) in a comfortable position and tighten star knob (6) to clamp the vertical movement of the suspension arm. Do not loosen star knob (6) again until balancing the suspension arm.
- Remove securing screw (2).
- Lubricate the microscope rotation shaft (4) lightly (e.g. with Vaseline).
- Insert the microscope rotation shaft (4) into the reception bore (3) of the suspension arm. Tighten securing screw (2) firmly. Securing screw (2) must engage groove (8). This is ensured when securing screw (2) is flush with the surface of the suspension arm.
- Tighten securing screw (1) firmly using a suitable tool (e.g. a pin face wrench).

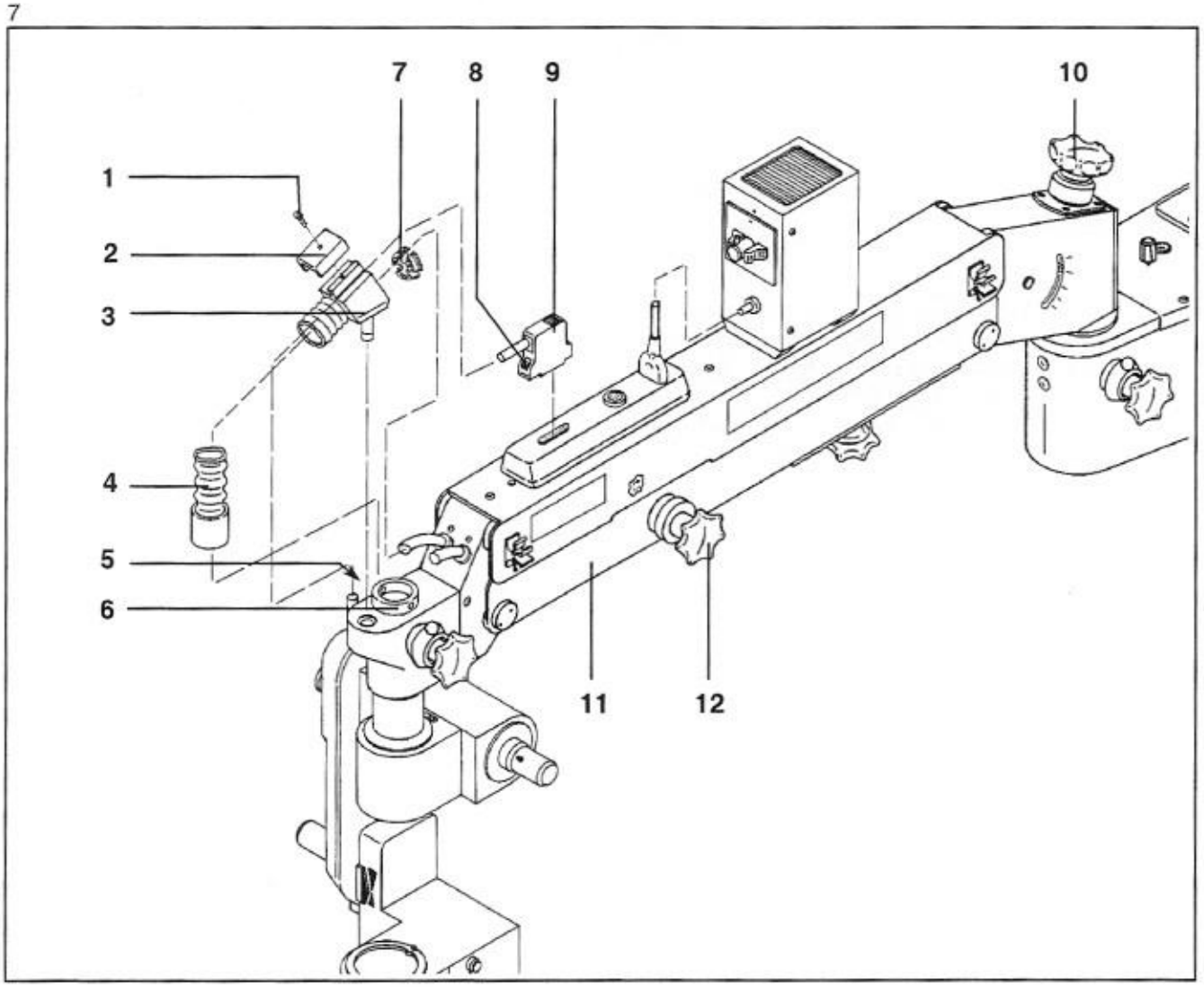
Caution:
Before using the instrument and after re-equipping it, always ensure that securing screws (1) and (2) are tightened firmly!

6



- Run the light guides into holder (3) and through the cable conduit.
  Note: This can be done easily when conduit (4) is taken off the microscope first.
- Insert holder (3) into the hole at the top of the suspension arm.
- Place cable separator (7) between the light guides and press it into holder (3).
- Connect cable conduit (4) to the microscope.
- Switch off the power at the suspension system.
- Plug in connector (9) for the electrical supply of the operation microscope and tighten screws (8) firmly.
  Note: Always turn the power off at the stand before disconnecting connector (9).
- Remove screw (1) and take cover (2) off.
- Place the microscope supply cable into holder (3) and re-attach cover (2) using screw (1).

7



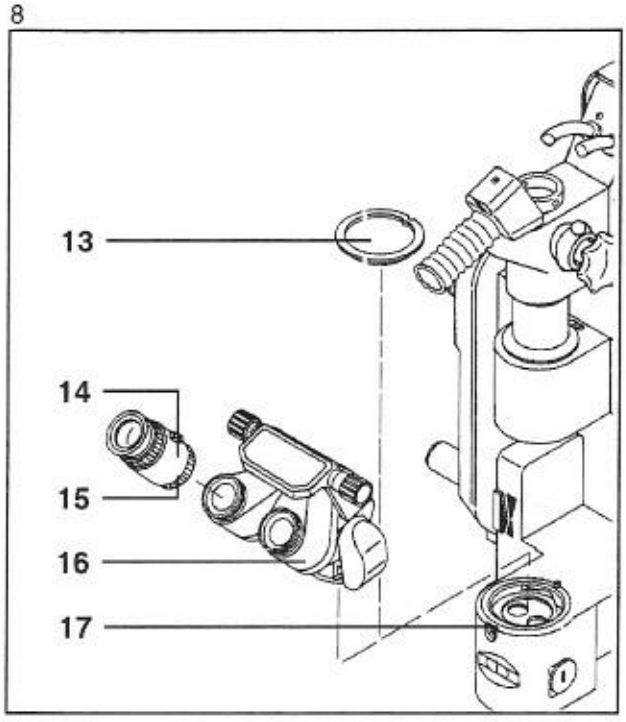
Note:

In order to change the microscope equipment, the microscope must be removed in the same manner but in reverse order. Observe the following points:

- Lower the suspension arm (11) to its lowest position and set the balancing weight to the lowest setting (3 kg) using star knob (10).
- Clamp the vertical movement of the suspension arm using star knob (12). Do not loosen star knob (12) until:
  - The microscope equipment has been changed.
  - The balancing of the suspension arm is to be done.

Caution:
Hold on to the microscope securely when loosening securing screws (5) and (6)!

8



Attaching the binocular tube and the eyepieces (figure 8)

- Loosen securing screw (17) a few turns.
- Remove cover (13) and store it.
- Place binocular tube (16) onto the operation microscope and tighten securing screw (17) firmly.
  Note: Other components may be installed between the microscope and the tube. These components are secured in the same manner using securing screw (17).

Caution:
Before using the instrument and after re-equipping it, always check binocular tube (16) and securing screw (17)!

- Screw the eyepieces (14) onto the eyepiece mounts and tighten knurled rings (15) firmly.

Caution:
Before using the instrument and after re-equipping it, always ensure that knurled rings (15) are tightened firmly!

Mounting the microscope component

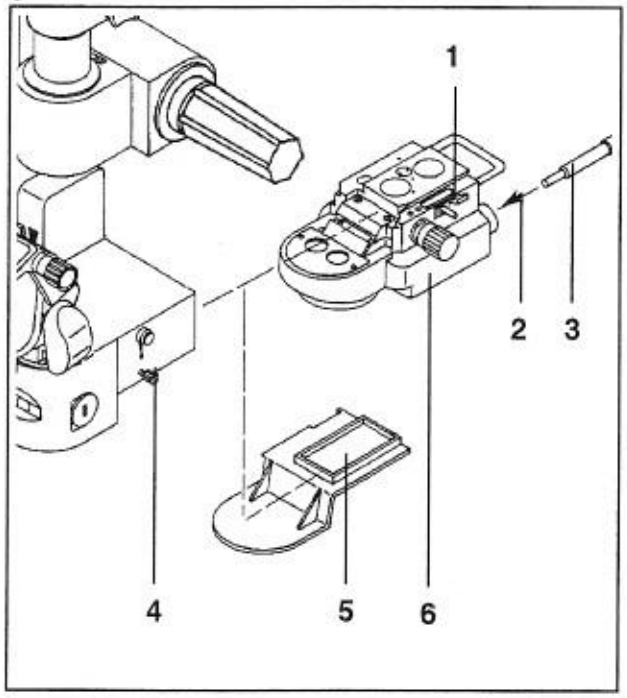
(figure 9)

- Loosen securing screw (4) a few turns.
- Pull off dust cover (5) to the back and store it.
- Insert the microscope component into the dovetail of the operation microscope and slide it in as far as it will go. Catch lever (1) must audibly click in twice.
- Re-tighten securing screw (4) firmly. Catch lever (1) and securing screw (4) now prevent the microscope component from coming off accidentally.

Caution:
Before using the instrument and after re-equipping it, always ensure that securing screw (4) is tightened firmly!

- Insert the light guides (3) into the light-guide sockets (2). The light guides are color-coded at the stand end so that they cannot be confused. The light guide must be installed so that the microscope can be rotated and tilted without stretching the light guide. If necessary adjust the position of the light guide.

9



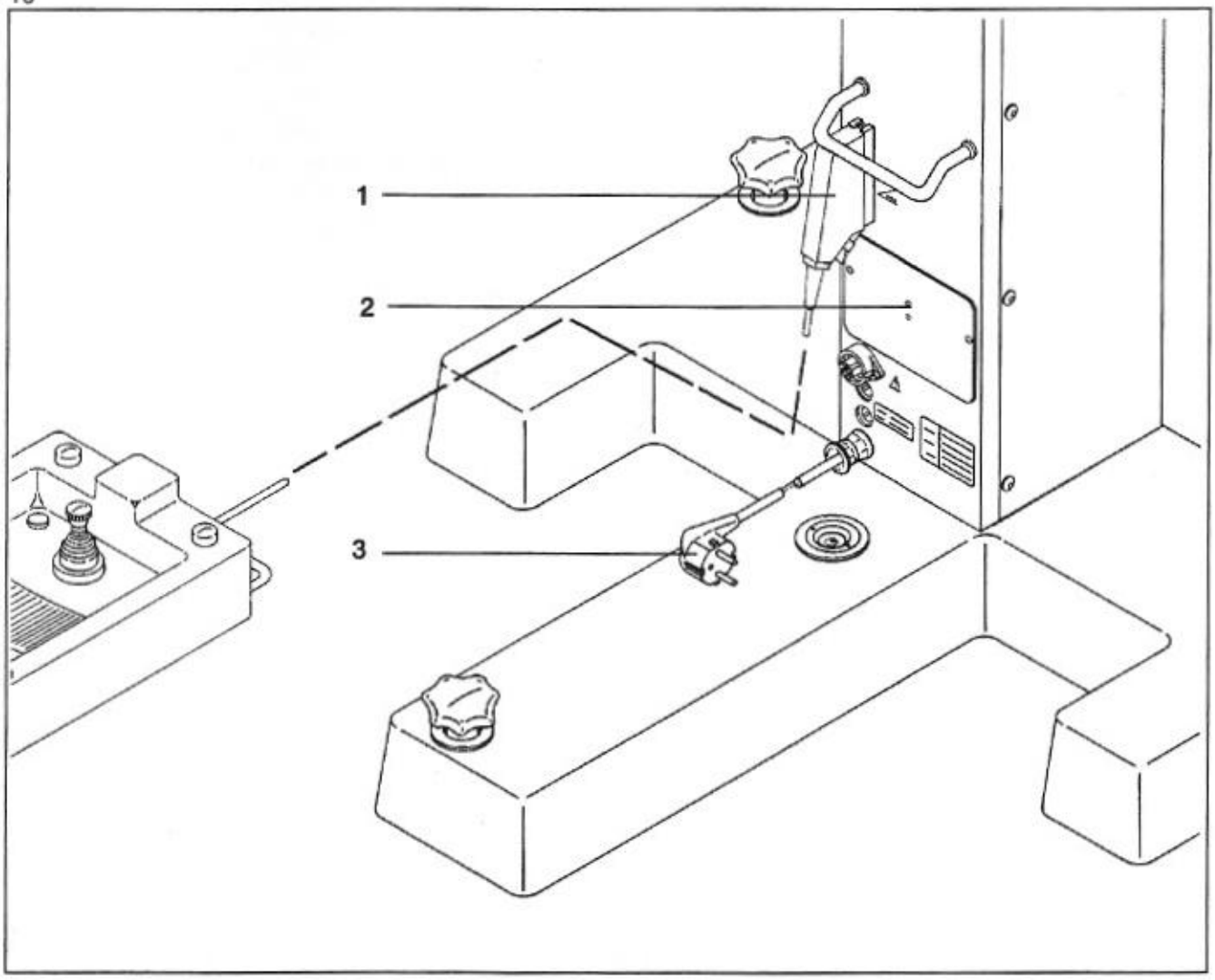
- To change the microscope component, loosen securing screw (4) a few turns. Press catch lever (1) and pull off the microscope component completely. Store the component not in use in a dust-free location.

Note:
The procedure for attaching the microscope component to the operation microscope is always the same despite the differing designs of the various components.

Electrical connections(figure 10)

- Check the voltage indicated at (2).
  Note: The suspension system is set for the voltage at the destination country in the factory. The voltage indicated at disk (2) must correspond with voltage of the available line power. If not, the instrument must be converted by our service representative.
- Plug the foot control panel connector (1) into the respective socket of the suspension system.
  Note: Only plug in or unplug these connectors when the power switch on the suspension system is turned off.
- Plug power cord (3) into a power outlet. The out let must have a good ground-wire connection.

10



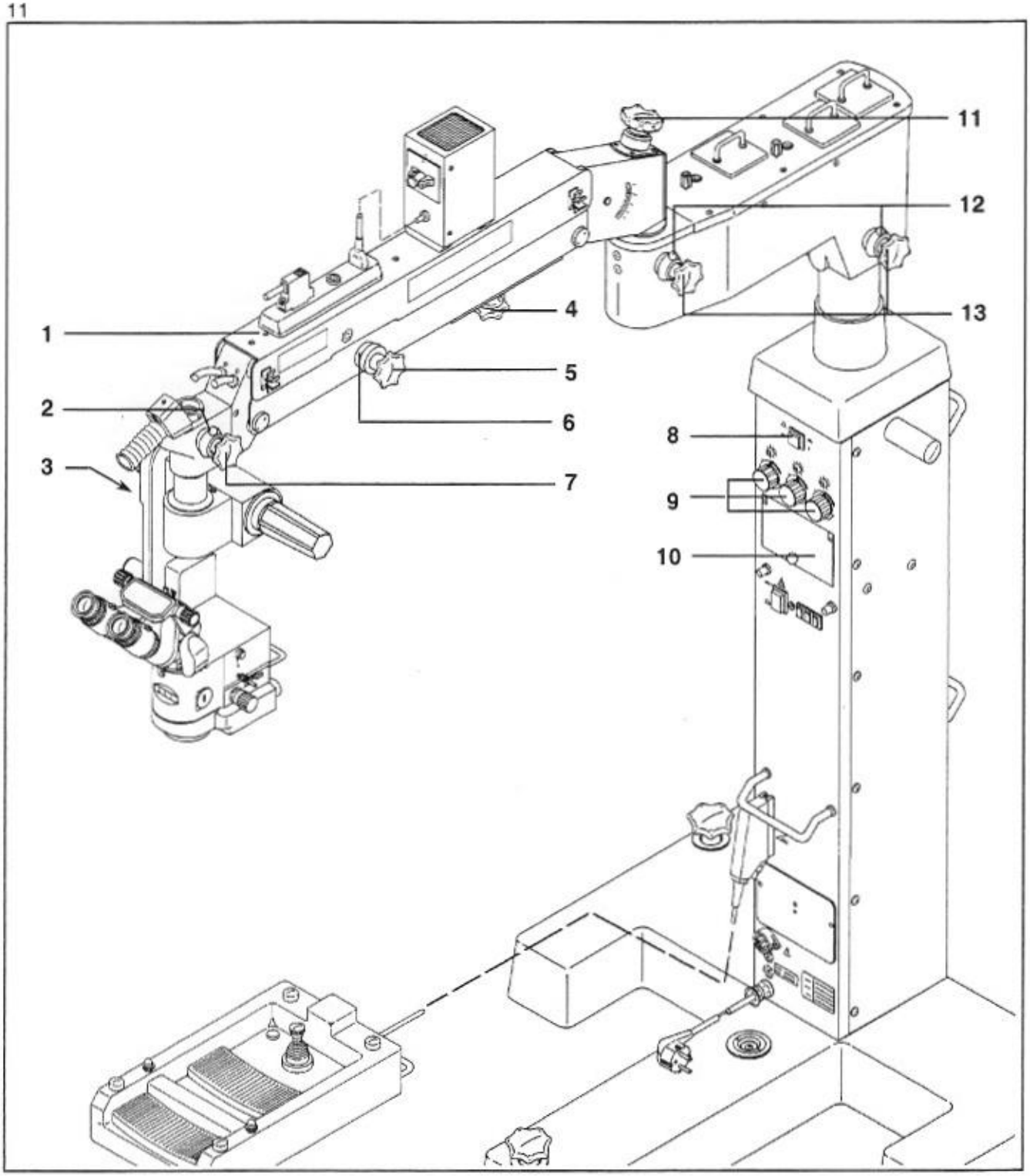
Adjusting the click-stop coupling

- Lift the operation microscope with your hand.
- Pull out knob (3) as indicated by arrow and push it up.
- Move the operation microscope to the desired tilt position (0°, 30°, 60°) and release knob (3). The knob clicks into position by itself and locks the tilt position.

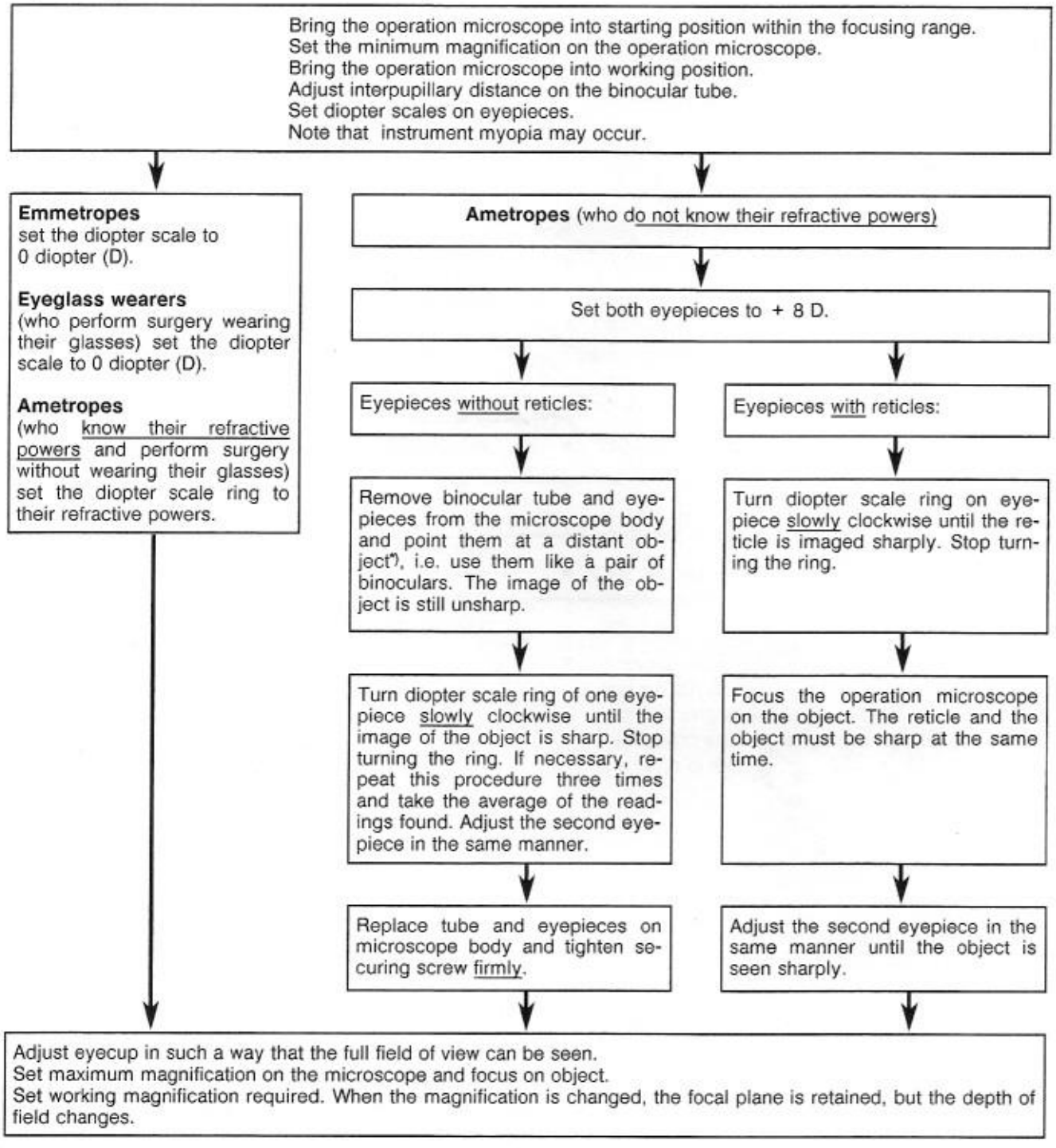
Balancing and adjusting the suspension system

- Hold the microscope and loosen star knob (5). Adjust the balance of suspension arm (1) using star knob (11). When properly adjusted, the microscope must remain stationary in the desired position.
  Note: The friction of the vertical movement can be adjusted using friction ring (6).
- Set the minimum working distance of the operation microscope to the field of surgery. To do this, loosen star knob (4) of the safety slider and lower the operation microscope to the lowest working position. Slide the safety slider in the direction of the operation microscope and re-tighten star knob (4). This safety device prevents unintentional downward movement past the stop setting.
  Check the stop setting by lowering the operation microscope to the stop.
- Loosen star knobs (7) and (13) on the suspension and carrier arms.
- If necessary, set the friction of the rotational movement using ball knobs (2) and (12). In this manner, you can optimally adjust the ease of movement to your needs.
- Switch on the main power at (8).
- Adjust the speed of the various functions (zoom, focus, tilt) using the knobs located underneath cover (10).
- Set the lamp control switches located underneath cover (10) to the foot control panel symbol.
- Activate the illumination at the foot control unit and switch on the illumination at knobs (9). Adjust the brightness using knobs (9). Start at a low brightness to lengthen the duty lives of the lamp bulbs.

11



Adjusting the operation microscope


Bring the operation microscope into starting position within the focusing range.
Set the minimum magnification on the operation microscope.
Bring the operation microscope into working position.
Adjust interpupillary distance on the binocular tube.
Set diopter scales on eyepieces.
Note that instrument myopia may occur.
Emmetropes
set the diopter scale to 0 diopter (D).
Eyeglass wearers
(who perform surgery wearing their glasses) set the diopter scale to 0 diopter (D).
Ametropes
(who know their refractive powers and perform surgery without wearing their glasses) set the diopter scale ring to their refractive powers.
Ametropes (who do not know their refractive powers)
Set both eyepieces to + 8 D.
Eyepieces without reticles:
Eyepieces with reticles:
Remove binocular tube and eyepieces from the microscope body and point them at a distant object*), i.e. use them like a pair of binoculars. The image of the object is still unsharp.
Turn diopter scale ring on eyepiece slowly clockwise until the reticle is imaged sharply. Stop turning the ring.
Turn diopter scale ring of one eyepiece slowly clockwise until the image of the object is sharp. Stop turning the ring. If necessary, repeat this procedure three times and take the average of the readings found. Adjust the second eyepiece in the same manner.
Focus the operation microscope on the object. The reticle and the object must be sharp at the same time.
Replace tube and eyepieces on microscope body and tighten securing screw firmly.
Adjust the second eyepiece in the same manner until the object is seen sharply.
Adjust eyecup in such a way that the full field of view can be seen.
Set maximum magnification on the microscope and focus on object.
Set working magnification required. When the magnification is changed, the focal plane is retained, but the depth of field changes.

Note: If several surgeons use the instrument, it is advisable to draw up a table with the individual refractive powers of each of the surgeons and to keep it in a handy location near the instrument.

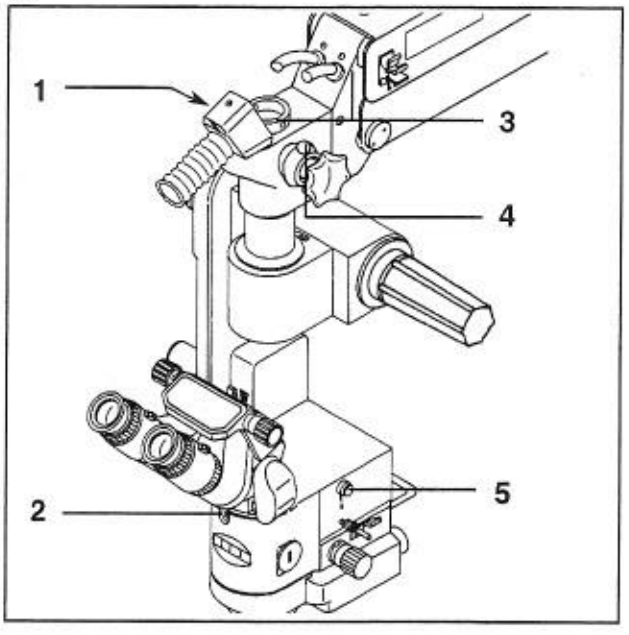
*) **Caution:** Never point at the sun.

The following points must always be checked (without the patient) before surgery:

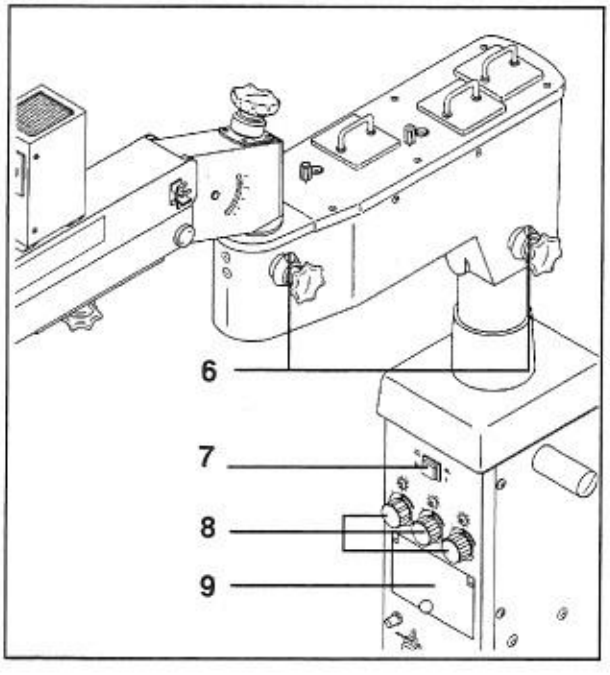
- Make sure all cables are connected.
- Securing screws (1), (2), (3) must be tightened firmly.
- Make sure the foot control unit is connected.
- Switch on power at power switch (7).
- Turn the illumination on at knobs (8) and check the function of the lamps (including the backup lamp module). You might have to activate the illumination at the foot control unit.
- Check the adjustment of the click-stop coupling.
- Check the balance of the suspension arm.
- Check the limitation of downward movement of the microscope.
- Check the friction of the microscope rotation and correct using ball knobs (4) and (6), if necessary.
- Check the tilt, zoom and focus functions over their entire ranges. Adjust the speed at the knobs located underneath cover (9), if necessary.
- Press button (5). The microscope must automatically move to the initial position of the focusing range.
- Check the interpupillary distance setting on the binocular tube.
- Check the eyepiece settings.
- Check the optical image over the entire magnification range.

Caution:
If a malfunction is detected, for safety reasons it is not allowed to operate using this instrument. If possible, correct the fault (see troubleshooting table, page 24) or contact our service dept.

12



13



Requirements

The suspension system, the operation microscope and the foot control panel are connected.

The instrument has been checked in accordance with the checklist.

- Move the stand to the desired position.

Caution:
The long extension of the stand base must always point in the direction of the surgical field.

- Level the stand using the three star knobs (7). A bubble level is located on the base.
- Re-check the setting of the minimum working distance to the field of surgery.
- If necessary, re-adjust the friction using ball knobs (1) and (2).

Operation

- Switch on the instrument at power switch (3).
- Move the microscope over the field of surgery to the desired position.
- Activate the illumination at the foot control unit and turn on the desired illumination at knobs (4). Adjust the brightness at knobs (4).
- Set to the lowest magnification (zoom function).
- Looking through the eyepieces, lower the operation microscope using the suspension arm to where the field of surgery comes into focus. If necessary, correct the eyepiece adjustments, see page 20.
- Set to the highest magnification (zoom function).
- Focus sharply on the field of surgery using the focusing function.
- Set to the desired magnification (zoom).
- When the instrument is not in use, power switch (3) must be turned off.

Caution:
Never look directly into the light source, e.g. into the microscope objective or into a fiber light guide.

Caution:
When operating on the eye, always use eye-protection filter GG 475 to prevent damage to the retina of the patient's eye.

What to do in an emergency

Failure of zoom function or zoom runs to end of magnification range:

- Switch to the back-up power supply (5) and set the desired magnification using rocker switch (6).

Failure of tilt motion or tilt moves to end stop:

- Switch to the back-up power supply (5) and set to desired position using rocker switch (6).

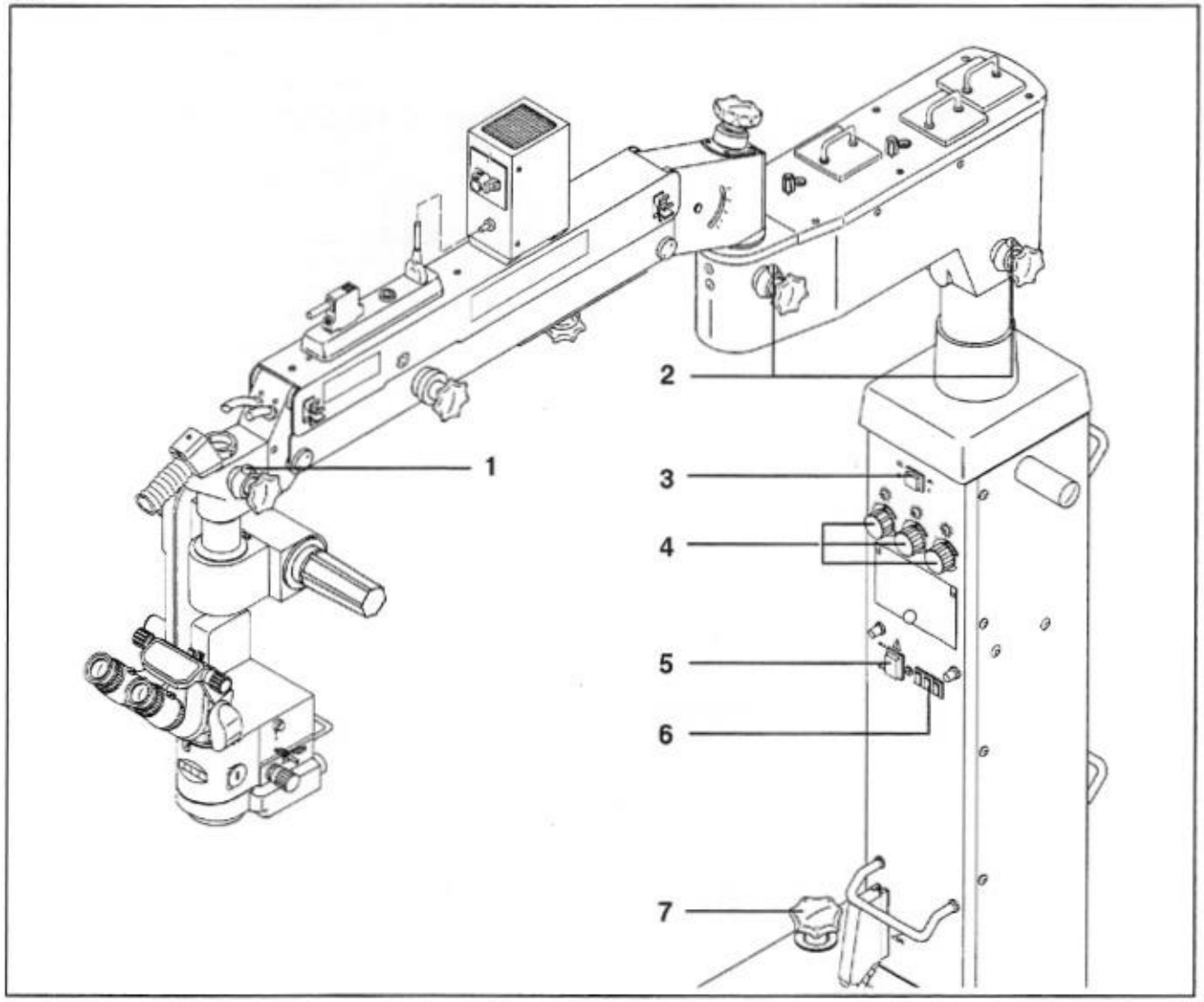
Failure of focusing function

- Focus using the movement of the suspension arm.

Lamp failure

- Switch the instrument off and install the back-up lamp module in lamp house. Switch the instrument back on.

14



Trouble-shooting table

Problem	Possible Cause	Remedy
No function at all.	Power plug not connected.	Connect power plug.
	Main power switch not pressed.	Press main switch. Green pilot light must come on.
	Fuse in suspension system blown.	Contact in-house electrician.
	Power failure.	Contact in-house electrician.
	Failure of suspension system electronics.	Contact service technician.
The microscope illumination is not working properly, but the green light in the power switch is on.	Halogen lamp is not turned on.	Turn on illumination at foot control unit. Adjust using the knob on front panel of suspension system.
	Halogen lamp defective.	Switch the instrument off, pull out the lamp module and insert the back-up module. Turn instrument back on. Change the lamp.
	Ceramic base does not have proper contact to halogen lamp.	Plug the ceramic base firmly onto the contacts of the halogen lamp
	Lamp module does not have proper contact.	Push in lamp module as far as it will go.
	Foot control unit not properly connected.	Connector must fit in with click.
	Thermal circuit breakers activated.	Press in red buttons on suspension system and listen for cooling fan. If the fan is not running, the circuit breakers will shut the system off again after a few minutes. Contact service technician.
	Light guide not properly inserted.	Insert light guide as far as it will go.
	Fuse in suspension system blown.	Contact in-house electrician.
	Defective foot control unit or electronics.	Illuminate area of surgery with surgical lamp. Contact service technician.
	Selectors located behind the cover plate on the stand are not set correctly.	Re-set the selectors.
Insufficient illumination.	Power too weak.	Adjust illumination using knobs on stand column.
	Light guide not properly inserted at lamp and/or microscope.	Insert light-guide as far as it will go.
	Defective light guide (illumination not even).	Contact service technician. Re-connect for other light guide.

Problem	Possible Cause	Remedy
Zoom system not functioning.	Foot control unit not connected properly.	The connector must click in.
	Back-up power supply is on.	Switch back-up power supply off.
	Defective fuse in stand column.	Contact in-house electrician.
	Defective foot control unit or motor.	Switch back-up power supply on (the yellow LED blinks) and set to desired magnification using the zoom switch (6) (see figure 14, page 23) on the stand. Note: When the back-up power supply is on, none of the functions on the foot control unit are active. Contact service technician.
Focusing not functioning.	Foot control unit not connected properly.	The connector must click in.
	Back-up power supply is on.	Switch back-up power supply off.
	Defective fuse in stand column.	Contact in-house electrician.
	Defective foot control unit or motor.	Focus using the suspension arm of the stand. Contact service technician.
Tilt system not functioning.	Foot control unit not connected properly.	The connector must click in.
	Back-up power supply is on.	Switch back-up power supply off.
	Defective fuse in stand column.	Contact in-house electrician.
	Defective foot control unit or motor.	Switch back-up power supply on (the yellow LED blinks) and adjust position using switches (6) (see figure 14, page 23) on the stand. Note: When the back-up power supply is on, none of the functions on the foot control unit are active. Contact service technician.
Microscope movement too sluggish or jammed.	The respective friction setting is too tight.	Loosen friction setting.
	Jammed (e.g. lacking lubrication)	Contact service technician.

Exchanging the halogen lamp on the carrier arm

(figure 15)

> **Caution:**
> When you exchange the lamp shortly after it has gone out, wear heat-protective gloves to prevent burns!

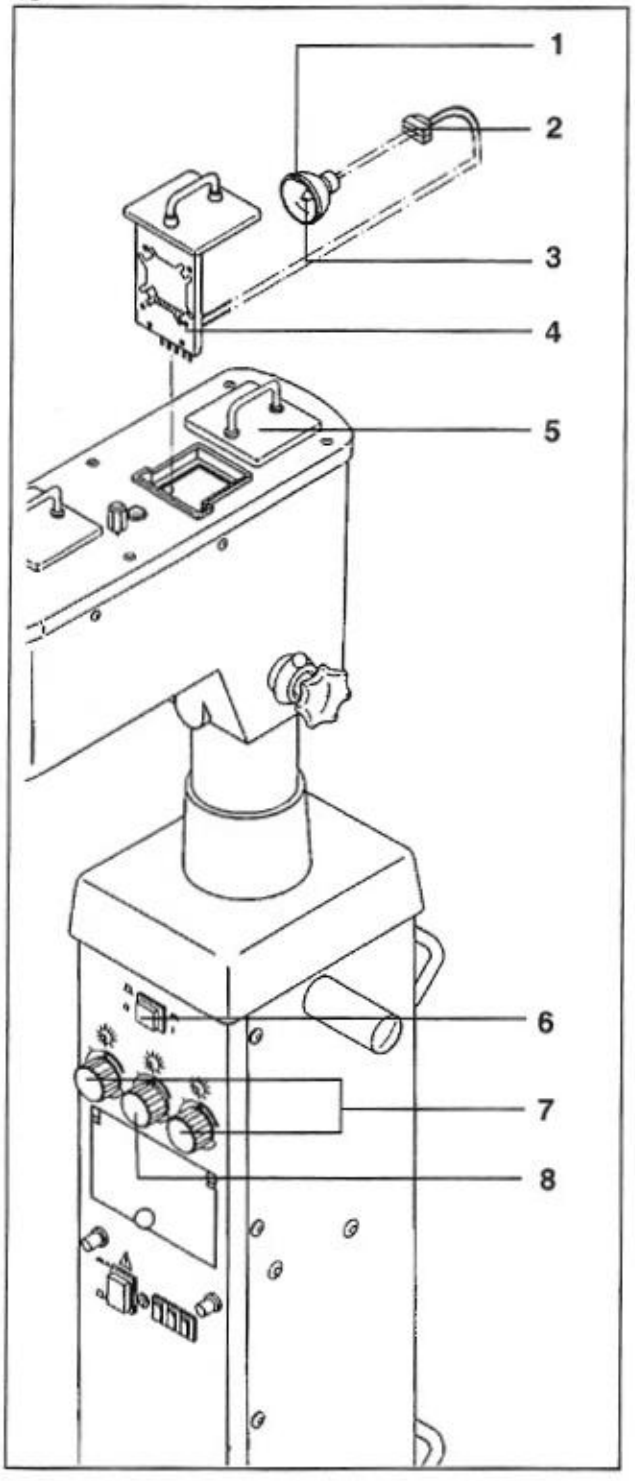
Note: If the halogen lamp goes out during the operation, install the back-up lamp module (5). It is thus important to check the back-up lamp module before surgery begins.

To change the halogen lamp, proceed as follows:

- Switch the instrument off at power switch (6).
- Turn off the illumination at knobs (7).
- Pull out lamp module (4).
- Pull the ceramic base (2) off of the contact pins of the halogen lamp.
- Pull the halogen lamp out of the spring holding device.
- Install the new halogen lamp. Observe the following points:
  - The centering nose (1) must fit into the hole.
  - Do not touch the lamp bulb (3) or the interior of the lamp reflector.
- Slide the ceramic base (2) onto the contact pins of the lamp.
- Install the lamp module with the new halogen lamp into the stand.
- Switch the instrument back on at power switch (6).
- Switch the illumination on at knobs (7).

Note: Only use 12 V, 100 W halogen lamps, catalog number 38 00 79- 9040.

15



Exchanging the halogen lamp in the lamp house (figures 15 and 16)

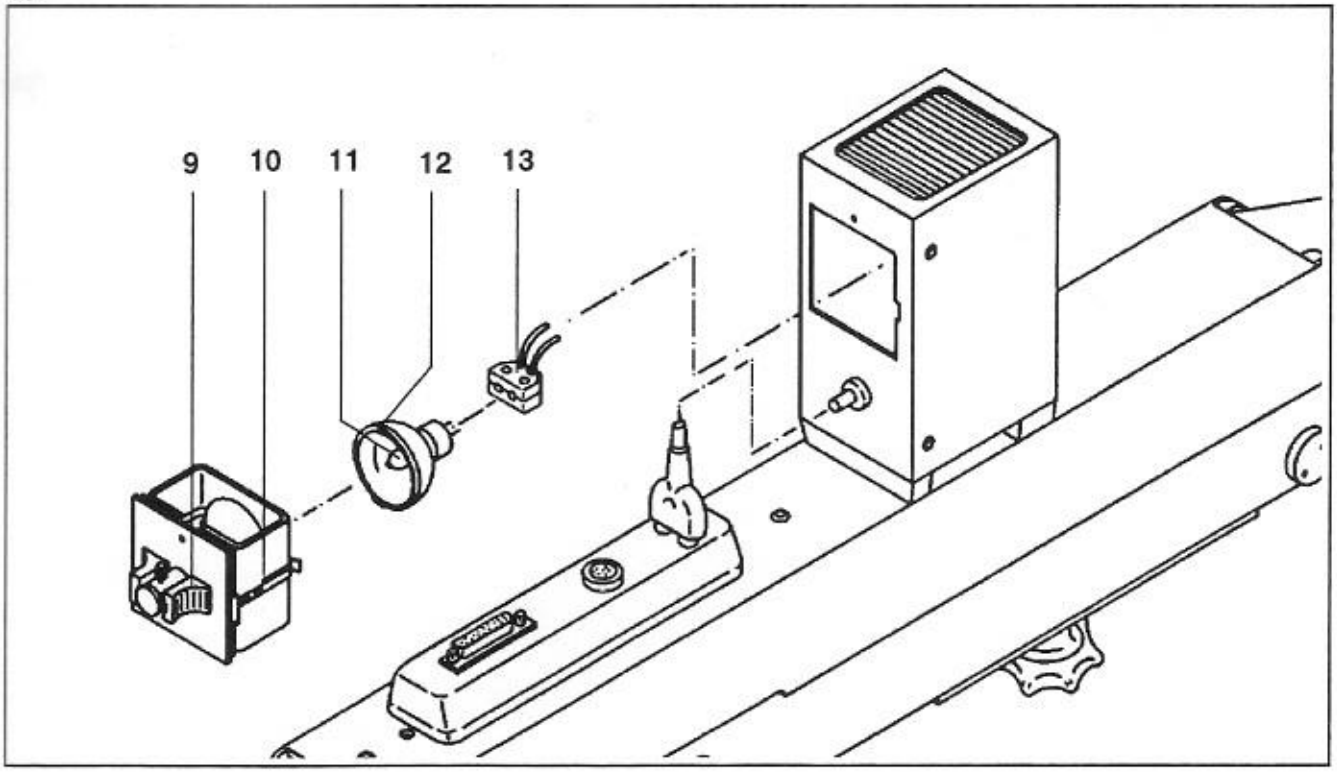
Caution:
When you exchange the lamp shortly after it has gone out, wear heat-protective gloves to prevent burns!

To change the halogen lamp, proceed as follows:

- Switch the instrument off at power switch (6).
- Turn off the illumination at knobs (8).
- Squeeze in the grips (9) and pull out lamp module (10).
- Pull the ceramic base (13) off of the contact pins of the halogen lamp.
- Pull the halogen lamp out of the spring holding device.
- Install the new halogen lamp. Observe the following points:
  - The centering nose (12) must fit into the hole.
  - Do not touch the lamp bulb (11) or the interior of the lamp reflector.
- Slide the ceramic base (13) onto the contact pins of the lamp.
- Install the lamp module with the new halogen lamp into the stand.
- Switch the instrument back on at power switch (6).
- Switch the illumination on at knobs (8).

Note: Only use 12 V, 100 W halogen lamps, catalog number 38 00 79- 9040.

16



Care of the microscope

Cleaning optical surfaces

The multilayer T* (T-star) coating of our optical components (e.g. eyepieces and objectives) results in optimum contrast and high-quality observation and image quality.

These advantages, which provide a brilliant image, are markedly impaired by even slight contamination of the optics or by a fingerprint. For this reason, when the microscope is not being used it should never be left without the objective, binocular tube and eyepieces installed. After use and cleaning, cover the microscope with a dust cover. Always store objectives, eyepieces and accessories which are not being used in dust-free cases.

The external surfaces of the optical components (eyepieces, objectives) should be cleaned on a regular basis:

- Blow off dust on the optical surfaces using a squeeze blower or a grease-free brush.
- Thorough cleaning is now extremely easy and can be quickly performed with our new antistatic cleaning cloths.
  Please follow the instructions on the packing of the cleaning cloths.

In this manner the optical image will remain brilliant and high in contrast.

Pack of 100 cleaning cloths:
Catalog no. 30 61 18- 0000

Cleaning painted surfaces

Painted surfaces should be cleaned with a cotton wad on a stick swab moistened with petroleum benzin (inflammable!)

Wipe off any residue with a mixture consisting of 50% ethyl alcohol and 50% distilled water plus a dash of dishwashing liquid.

Sterilization

The asepsis set available from Carl Zeiss contains rubber caps, sleeves and grips which can be sterilized in conventional autoclaves. We recommend two programs for sterilization:

- Sterilization temperature : 120° C
  Sterilizing time : 20 minutes
- Sterilization temperature : 134° C
  Sterilizing time : 5 minutes

For sterilizing the operation microscope you may use the single-use sterile drapes.

Magnifications / Fields of view

Using the magnification factor, which can be read in magnification window (5), page 11, you can calculate the total magnification of the microscope.

If:

f_{tube} is the focal length of the binocular tube,

f_{obj} is the focal length of the main objective,

γ is the factor set on the zoom system,

M_{eye} is the magnification of the eyepiece,

then the total magnification of the operation microscope can be calculated according to:

$$M_T = \frac{f_{tube}}{f_{obj}} \cdot \gamma \cdot M_{eye}$$

Example:

f_{tube} = 170 mm, f_{obj} = 200 mm, γ = 1.6 and M_{eye} = 10 x.

The total magnification is thus:

$$M_T = \frac{170}{200} \cdot 1.6 \cdot 10 = \underline{\underline{13.6}}$$

If total magnification M_T of the operation microscope is known, the field of view diameter (FoV_D), i.e. the circular area of the surgical field which can be seen through the microscope when used properly, can be calculated according to:

$$FoV_D = \frac{FoV_N \cdot M_{eye}}{M_T}$$

FoV_N in the above formula stands for the field-of-view number, which is marked on our widefield eyepieces.

Using M_T = 13.6 from the example above, the field-of-view diameter is thus:

$$FoV_D = \frac{22 \text{ mm} \cdot 10}{13{,}6} = \underline{\underline{16.2 \text{ mm}}}$$

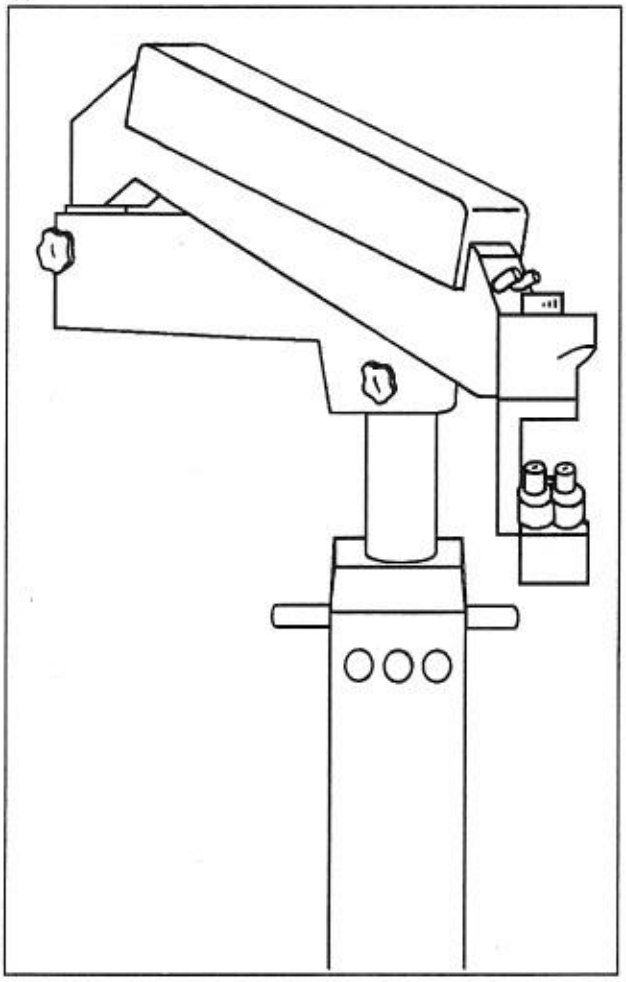
Moving the instrument

(figures 17 and 18)

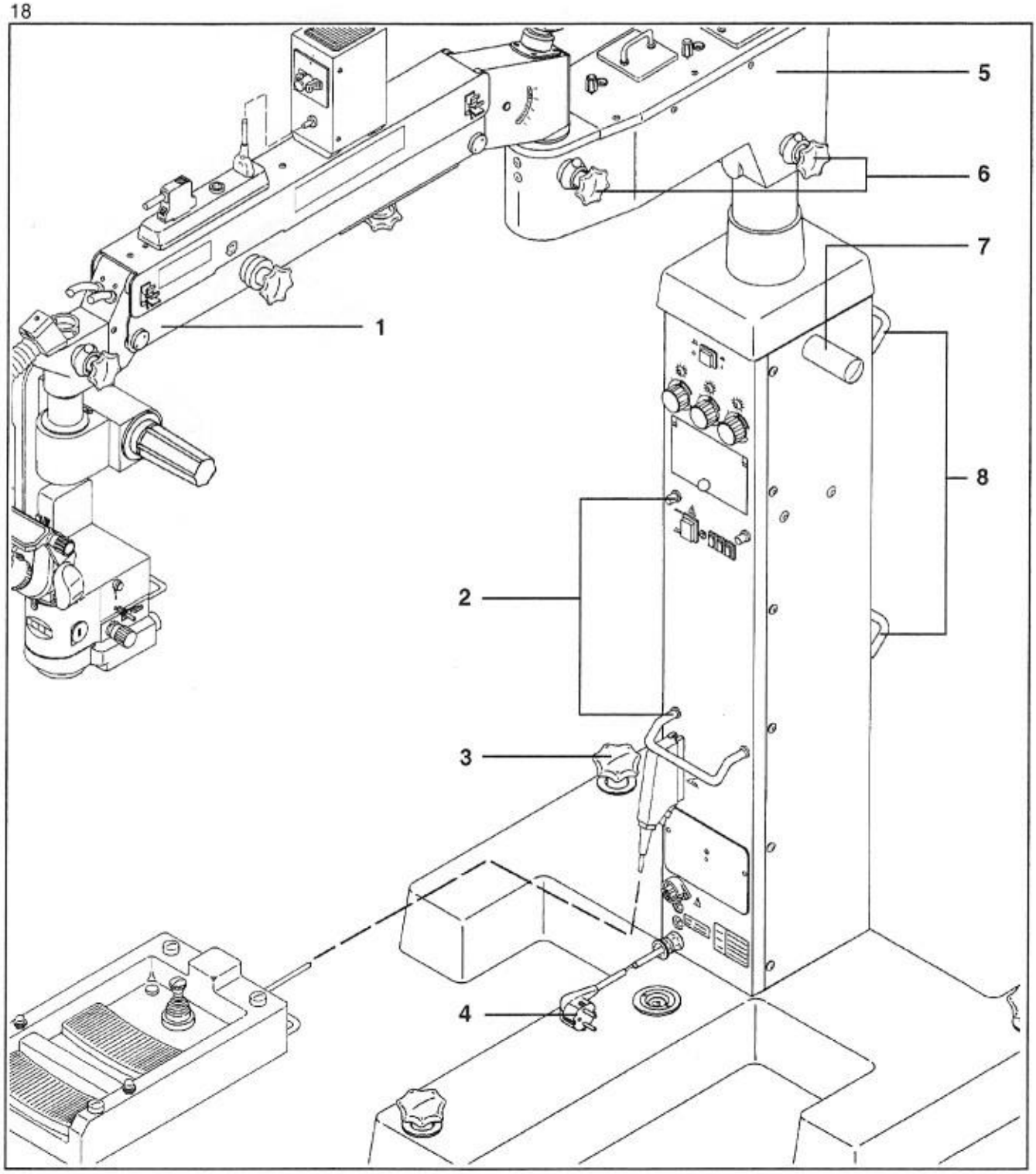
Observe the following points when moving the instrument:

- To make sure the stand cannot tip when moving it, pull in the suspension arm (1), the carrier arm (5) and the microscope so that the center of gravity is as close to the stand column as possible. See figure 17. Tighten star knobs (6) to clamp the arms in this position.
- Roll up the foot control panel cable on bars (8) and hang the foot control panel on the top bar (8).
- Roll up the power cord (4) on bars (2).
- Turn star knobs (3) counter clockwise. The stand may now be rolled.
- Be careful of clearance height when passing through doorways.
- When moving the stand, use handles (7).
- Avoid collisions of any kind.
- Do not go over steps or edges. The stand might topple!
- Be extremely careful when moving over inclined surfaces.
- Do not park the instrument on inclined surfaces.

17



18



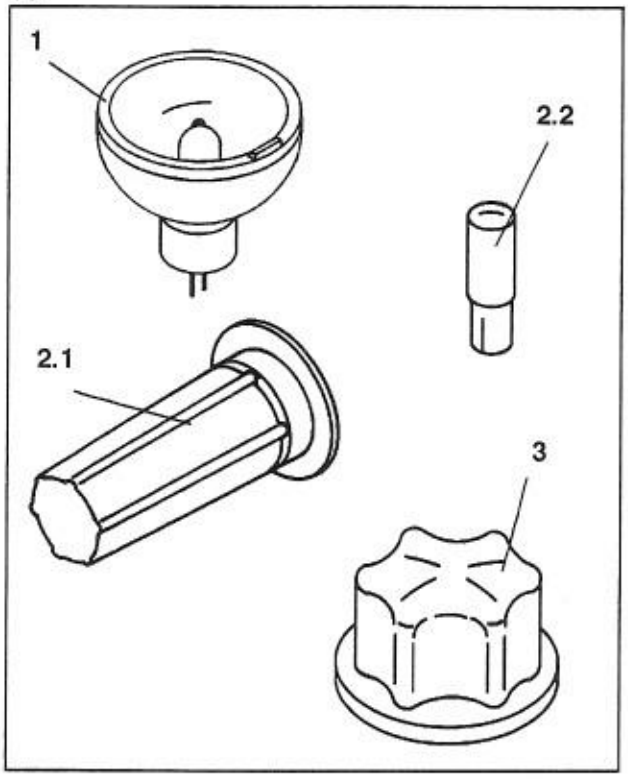
Spare parts

		Catalog number
1	Halogen lamp 12V, 100W	38 00 79- 9040
	Pack of 100 Prophot cleaning cloths (not shown)	30 61 18- 0000

Asepsis

2	Asepsis for OPMI CS with Retrolux 3. containing:	30 25 30- 9002
	2.1 Sterilizable rubber cap (4 pcs)	30 26 27- 9001
	2.2 Sterilizable rubber cap (2 pcs)	30 58 09- 0000
3	Sterilizable caps for 170 mm tube (inter-pupillary distance setting) (6 pcs)	30 58 10- 0000

19



Operation Microscope OPMI CS

Magnification	Zoom system with 1:6 zoom ratio. Total magnification when using Retrolux 2 or Retroskop 2 and 10x eyepieces: 3.4x – 20.4x. Total magnification when using Retrolux 3 and 10x eyepieces: 4x - 24x. Motorized zoom activated over hand or foot control panel or over operating chair. Speed adjustable at suspension system.
Focusing	Motorized focusing, speed adjustable at suspension system within range of 1.5 and 5 mm /s.
Illumination	Fiber-optic illumination with 12 V 100 W halogen reflector lamp supplied from lamp house in suspension system.
Microscope suspension	Microscope rotates 330° around vertical axis; Stops of click-stop coupling : 0°, 30°, 60° Motorized coordinate front-to-back and lateral tilt motion: ±50 mm.
Electrical	In accordance with IEC 601-1. Class I, type B.

Catalog numbers

	Catalog number
Operation Microscope OPMI CS	30 26 22- 0000
Inclinable 180° binocular tube, f = 170 mm	30 37 88- 0000
10x22B screw-type widefield eyepieces (2 pcs)	30 55 30- 0000

Weight of microscope body

8.2 kg

When using Stand S4, the weight of the entire microscope equipment, including the accessories, must not exceed max. 20 kg.

Subject to change.

Sterilization Methods

Gas (ETO) Sterilization*

Standard ETO is acceptable for use with Kraton* thermoplastic rubber based compounds. The ETO gas will penetrate the Kraton, plasticize it and relieve molded in stresses or imposed stresses on the part.

Aeration time is greatly dependent on the size of the master carton and its permeability. One week is the minimum requirement to bring the ETO residuals below 1 PPM, as tested by the standard liquid extraction method. If the product is heated to 125-135 F in an aeration chamber with high airflow, the time can be accelerated to as little as four days.

Gamma Sterilization*

Kraton thermoplastic rubber can be sterilized using gamma radiation without suffering a large loss in physical properties even after extended storage.

Kraton G-2705 rubber was exposed to Cobalt 60 radiation doses of 3, 6, and 12 Mrads. The table below shows the effect of the radiation on the tensile properties of the material after being aged for 21 months.

Property	Original	0 Mrads	3 Mrads	6 Mrads	12 Mrads
Hardness, Shore A	55	50	48	48	43
Tensile Strength, psi	1200	+8%	+12%	-3%	-15%
300% Modulus, psi	350	+3%	-4%	-10%	-15%
Elongation, %	700	+3%	+10%	+8%	+12%

Steam Sterilization*

GLS Corporation can suggest the following maximum autoclave cycles for selected materials**

250 F for 17 minutes

240 F for 27 minutes.

There will be some slippage or creep with any Kraton thermoplastic rubber based products at these temperatures because of the relieving of molded in stress and the relaxation of imposed stresses. To minimize these effects, parts should be molded at the suggested processing conditions, and not autoclaved while being subjected to outside mechanical stresses.

* Information pertains only to Kraton G-based compounds
** Information pertains only to Kraton G-2705 compound.

Disposables

Endure Number		
	Spare Bulbs	
90-1200	Zeiss 6V 30W Bt58Z	390158
90-1201	Zeiss 6V 50W Bt86Z	390186
90-1202	Zeiss 12V 100W HLX #64626	380075 1020
90-1203	EFR Housing #900	
90-1204	Zeiss 15V 150W EFR	310198
90-1205	Zeiss 12V 100W HLX #64627	380079 9040
90-1206	Zeiss Superlux 40	
90-1207	Zeiss Superlux 175	
90-1208	Zeiss Superlux 300 with Cartridge	
90-1209	Zeiss Superlux 300 Bulb Only - No Housing or Meter	
90-1302	ELS 150 21V 150W EKE	
90-1400	ELS 250 24V 250W ELC	
90-1403	ELS 24 60V 24W Metal Halide	
90-1402	ILO 300W with Cartridge	
	Sterilizable Knob Covers	
91-0100	Zeiss Knob Cover, MD Zoom	302602 0203
91-0101	Zeiss Knob Cover, 0-60 PD Adjustment	303418 0000
91-0102	Zeiss Knob Cover, Small, 0-180 PD Adjustment	305810 0000
91-0103	Zeiss Knob Cover, Medium,	305807 0000
91-0104	Zeiss Knob Cover, Magnification Changer	303673 0000
91-0105	Zeiss Knob Cover, Large	305803 0000
91-0106	Zeiss Knob Cover, Extra Large	303674 0000
91-0110	Zeiss Handle Cover, CS/MD Short	302501 9060
91-0111	Zeiss Handle Cover, CS/MD Long	302627 9001
91-0112	Zeiss Handle Cover, F-Cover	305808 0000
91-0113	Zeiss Handle Cover, Pro Magis	
91-0114	Zeiss Hande Cover for MDU Post	305809 0000
	Dust Covers	
92-0010	Dust Cover, Large	
	Foot Control Covers	
92-0200	Endure Poncho Disposable Foot Control Cover, 20 per Case	
	Drapes	
93-8222	Sterile Drape, 50/180cm, 20/70", Zeiss 48mm, Zeiss OPMI 1/OPMI 6 w/o Side Observer, 20 per Case	
93-8214	Sterile Drape, 115/180cm, 45/70", Zeiss 48mm, Zeiss OPMI 1/OPMI 6 w/Side Observer, 20 per Case	
93-8296	Sterile Drape, 115/300cm, 45/118", Zeiss 65mm, MD/CS/11/111/ORL/Pro Magis/Neuro/ VISU 150/VISU 200, 20 per Case	